

# **Intel® Platform Instrumentation Control Console User's Guide**

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# What is Platform Instrumentation Control?

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Platform Instrumentation Control (PIC) uses the Desktop Management Interface (DMI) 2.0 framework to manage Windows<sup>†</sup> 2000 Advanced Server, or Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1 server hardware components. PIC provides real-time monitoring and alerting for server hardware sensors.

PIC has two main software components:

- The managed server: Platform Instrumentation (PI) is installed on the Windows 2000 Advanced Server, Linux Red Hat 7.1 server or Red Hat Enterprise Linux AS 2.1 that is going to be managed by the PIC Console software.
- The managing console: PIC Console software is installed on the user console that will manage the server.

On a Windows 2000 Advanced Server network, it is possible to install both parts of the software on the same server. It is also possible to install both the Server Instrumentation and the Console software on multiple systems.

## Features

The following list summarizes the features of PIC:

- Graphical user interface
- Consolidated server health information
- Interchassis management via the Intelligent Chassis Management Bus (ICMB)
- Enterprise System Management Console (ESMC) integration, which means that PIC can run under HP OpenView<sup>†</sup> Network Node Manager 6.1; or CA-Unicenter<sup>†</sup> TNG 2.4, as well as under the ISC Console provided with ISC software.
- Remote installation of the server software (depending on the OS)
- RPC-based transport mechanisms
- DMI 2.0 service providers

System administrators can use PIC to:

- Remotely monitor server hardware sensors
- Configure sensor thresholds
- Update the server's LCD display (if available)
- Configure, receive, and act upon alert events in the system event log (SEL)
- Configure audio or visual notifications in response to an event
- Configure options to shut down, reboot, or power-off the system automatically in response to an event

## Tracking System Status

Using PIC, you are able to track system status and manage hardware conditions such as:

- Temperature
- Voltage
- Cooling fan status
- Chassis intrusion
- ECC memory
- Processor status
- Power supply status
- PCI Hot Plug (PHP) slot status

Some of these conditions have a threshold or range of acceptable values. Default values are configured during system manufacturing. These values, along with the current readings, error status, and timer settings, can be configured and monitored through PIC. An event occurs when a parameter crosses a defined threshold. At the time an event occurs, PIC initiates the action you have configured.

For example, if the temperature reaches a level that is outside of the user-defined threshold, an event has occurred. You can configure PIC to respond to this event in multiple ways, such as:

- Display a message or sound an alert
- Shut down the server
- Record the event in a system log

You can also use PIC to view:

- System hardware inventory
- BIOS and system slot information
- Onboard Adaptec<sup>†</sup> SCSI controller status
- Onboard LSI<sup>†</sup> (Symbios) SCSI controller status
- Onboard QLogic<sup>†</sup> SCSI controller status
- Onboard Promise<sup>†</sup> IDE controller status
- Onboard Intel<sup>®</sup> LAN adapter status

## Managing Third-Party Components, DMI, and MIF Files

PIC uses the Desktop Management Interface (DMI) to monitor components, such as hardware sensors, inventory information, and third-party instrumentation on server systems. PIC monitors the motherboard, chassis, onboard Adaptec, LSI (Symbios) and QLogic SCSI controllers, onboard LAN adapters, and onboard Promise IDE controllers.

To provide these capabilities, each DMI-enabled component must provide a Management Information Format (MIF) file, which describes the manageable attributes of that component. For example, the current reading of a temperature sensor is an attribute that could be listed in a MIF file.

The PIC Console GUI running on a local management console (Windows 2000 Advanced Server) can manage components on a remote managed server (Windows 2000 Advanced Server). PIC also includes a translator to allow management of the DMI-enabled component instrumentation from a remote SNMP application.

For more information on DMI, see the Desktop Management Task Force (<http://www.dmtf.org>) on the World Wide Web.

## Glossary

The following terms and abbreviations are used in this document:

| Term | Description   |
|------|---|
| DIMM | Dual In-line Memory Module  |
| DMI  | Desktop Management Interface  |
| DPC  | Direct Platform Control   |
| ESMC | Enterprise Server Management Console, a non-ISC or third-party console that can integrate with ISC software |
| ISC  | Intel Server Control  |
| MIF  | Management Information Format, used by DMI for describing component instrumentation                         |
| MMC  | Microsoft Management Console  |
| NMI  | Non-Maskable Interrupt  |
| ONC  | Open Network Computing  |
| PHP  | PCI Hot Plug  |
| PIC  | Platform Instrumentation Control  |
| RAID | Redundant Array of Inexpensive Disks  |
| RPC  | Remote Procedure Call   |
| SBE  | Single-Bit Error  |
| SEL  | System Event Log  |
| SMI  | System Management Interrupt   |
| SNMP | Simple Network Management Protocol, a standard network protocol for management information                  |
| SSU  | System Setup Utility  |



# Launching PIC

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PIC can be launched from and can manage servers from one of these management environments:

- H-P Network Node Manager
- CA-Unicenter TNG
- Intel Server Control (ISC) Console

Once the PIC GUI application is launched from a management console, the management console application can terminate, and PIC will continue to operate normally.

## H-P OpenView Network Node Manager

The H-P Network Node Manager Console autodetects servers that are capable of supporting one or more of the ISC applications. The ISC applications currently supported include PIC, DPC, DMI Explorer, and CSSU. The Console updates the server bitmap with an ISC server icon for those servers capable of supporting one or more of the ISC applications. The PIC application will be included, provided the server is running Platform Instrumentation.

To launch PIC, select an ISC-enabled server on the H-P Console network map, and then select the "Platform Instrumentation Control Applet" option from the Tools Menu. Alternatively, you can launch the PIC application by selecting an ISC-enabled server on the H-P console network map, clicking the right mouse button, selecting "Launch ISC" and then selecting the "Intel, Platform Instrumentation Control" option from the popup menu.

## CA-Unicenter TNG

The CA-Unicenter TNG Console autodetects servers that are capable of supporting one or more of the ISC applications. The ISC applications currently supported include PIC, DPC, DMI Explorer, and CSSU. Autodetection of servers capable of supporting PIC will occur if the ISC-TNG AutoDiscovery service is running on the console and the server is running Platform Instrumentation. The ISC-TNG AutoDiscovery service should start automatically after installation. It is possible to start this service manually if the need arises from either the TNG Unicenter "Auto Discovery" dialog or from the Windows "Services" utility.

The ISC-TNG AutoDiscovery service creates a new ISC object in the CA Unicenter TNG user interface for each server running the Platform Instrumentation software. That ISC object displays on the map as a child of the "ISC World View" and as a child of the ISC-enabled server. You can view all ISC-enabled servers under the "ISC World View."

To launch the PIC application, right-click on an ISC icon and select the "Launch ISC" option. A popup menu will appear from which "Intel, Platform Instrumentation Control" can be selected which will launch the PIC application.

## **Intel® Server Control (ISC) Console**

The Intel Server Control (ISC) Console is a management console that provides basic server management without having to use an enterprise system management console (such as H-P OpenView) or a workgroup management console (such as LANDesk Server Manager).

To launch PIC from within the ISC Console, click the PIC icon in the Tool Pane.

## Using PIC

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When you start PIC, the main window displays a tree view. You can expand the view to show the sensor types supported on the managed server and further expand it to display detailed sensor information.

A presentation area on the main PIC window displays current readings, threshold configurations, inventory, and other related information for selections made in the tree view. The main window also displays the server's LCD (if available) and a picture of the PIC bitmap.

Most of the PIC sensors have associated thresholds that trigger alert actions when the thresholds are crossed. You can:

- Specify which alert actions you want to occur.
- Modify the default thresholds.
- Configure the default actions and notifications for each threshold.

When a parameter crosses a threshold, you can have PIC:

- Beep the speaker on the managed server.
- Display an alert on the managed server.
- Log the event to disk on the managed server.
- Broadcast a message.
- Write a message to the LCD on the managed server.
- Page an administrator.
- Use one of the shutdown/power control options to shutdown the OS, do a hardware reset, or power-off the server.

## The PIC Console Main Screen

PIC uses a Windows Explorer-like model, with a navigation pane (tree view) at the window left and a presentation pane (list view) at the window right. When you select a sensor from the tree, the presentation pane shows a set of tabbed pages with sensor-specific information.

The main screen of the PIC application is continually updated to show current sensor status. Specific PIC sensor dialogs (such as temperature and voltage sensors) show the current sensor reading when displayed and are updated dynamically during refresh.

# Main Menu Bar

The Main Menu Bar includes the following options:

| Item           | Options   |
|----------------|---|
| File Menu      | <b>Exit:</b> Exits the application  |
| View Menu      | <b>Toolbar:</b> Toggles the toolbar on or off.<br><b>Status Bar:</b> Toggles the status bar on or off.<br><b>Large Icons:</b> Displays list using large icons.<br><b>Small Icons:</b> Displays list using small icons.<br><b>List:</b> Displays items in list format.<br><b>Details:</b> Displays items in detail format.<br><b>Arrange Icons:</b> Arranges icons by name or status.<br><b>Refresh:</b> Triggers an immediate screen and data refresh.<br><b>Options:</b> Displays the view options dialog so you can configure viewing preferences, such as temperature format and display refresh rate.                                   |
| Configure Menu | <b>Enable Front Panel Power &amp; Reset:</b> Toggles the front panel power and reset option.<br><b>Enable Watchdog Timer:</b> Toggles the watchdog timer option. When this option is enabled, you can set the timer value.<br><b>Watchdog Timer Value:</b> When the watchdog timer option is enabled, the timeout dialog appears so you can set the timeout value. When the timer is disabled, the dialog does not appear.<br><b>Restore Factory Defaults:</b> Restores factory default values for threshold sensors and the Watchdog Timer.<br><b>Paging Configuration:</b> This command takes you to the paging Configuration dialog box. |
| ICMB Menu      | <b>View Managing Server:</b> Enables the default local managing server view.<br><b>View Managed Server(s):</b> Accesses the ICMB-managed server view(s).<br><b>Reclaim Inactive Resources:</b> Reclaims inactive ICMB resources on the managing server.   |
| Help Menu      | <b>Help Topics:</b> Accesses PIC help topics.<br><b>About PIC:</b> Displays PIC version information.  |

## Toolbar

The toolbar allows quick access to some menu items. To hide the icon toolbar, click the right mouse button over the toolbar, and then click the Hide item that appears.

## Navigation Pane

The Navigation Pane shows a tree view of server components that can be monitored. Many branches of the tree represent group components that have subbranches (nodes). These group items are identified by the tree expansion icons (“+” or “-”) appearing to the left of the component name. These branches can be expanded to list nodes (detail sensor list) or collapsed to hide nodes.

## Server BitMap

The Server Bitmap shows a picture of the server splash screen. To hide the picture, click the right mouse button over the picture, and then click on the “Hide” popup menu that appears.

## LCD Display

The LCD Display Pane shows the actual server LCD contents and a button to set the LCD contents on the server. If the server hardware does not support LCD, the pane does not display.

## Status Bar

The Status Bar displays status messages. To hide the status bar, click the right mouse button over the status bar, and then click on the “Hide” popup menu that appears.

## Presentation Pane

When you select a branch (group component) in the navigation pane, the presentation pane displays a set of icons (list view) representing each group node (detail sensor list). The detail view provides more information on each node item. You can arrange these list view items by name (sorted alphabetically) or by status (sorted by current status: critical, noncritical, and OK). To change the presentation pane, click the right mouse button over the pane, and then select from the popup menu that appears. This popup menu has two items:

- **View**—Changes between large icons, small icons, list, or detail view
- **Arrange Icons**—Arranges the list view icons by name or status

When you select a node in the navigation pane, the presentation pane displays a set of tab pages representing the detail sensor information. Depending on the node selected in the navigation pane, one of the following four pages is displayed:

- **Sensor Settings**—Displays the sensor's current status and current value, threshold values and error counts.  
Use this screen to configure new threshold values (such as Upper Critical Threshold, Upper Noncritical Threshold).  
The sensor status is also represented as a colored "Health" icon: Red is critical, Yellow is noncritical, Green is OK, and Blue is an unsupported sensor.
- **Alert Actions**—Displays the currently configured alert actions for each threshold type (such as Voltage-Status Changed to Upper Critical, Voltage-Status Changed to Lower Critical).  
Use this screen to change the alert actions for each supported threshold. The factory default alert actions are Log the Event to Disk and Write a Message to the LCD.
- **Sensor Information**—Displays individual sensor information (such as Sensor Tolerance, Maximum Reading, Minimum Reading).
- **Inventory Information**—Displays inventory information for the sensor (such as Description, Manufacturer). The information varies based on the sensor type.

## Sensor Dialogs

### Alert Actions

All of the sensor dialogs have an Alert Actions tab. Use this tab to specify the actions to be taken in the event of an alert on the associated sensor.

The factory default alert actions are to log the event to disk and to write a message to the server's front-panel LCD.

## Sensor Information

Each sensor has a sensor information tab that displays individual sensor information, such as specifications and reading extremes.

## Inventory

Each sensor has an inventory information tab that shows information about the sensor.

## Health

Information about all unhealthy sensors is copied under the Health branch. Select the Health branch of the server tree in the navigation pane to get a quick and simple view of the current server health. If, for example, a 12V voltage sensor indicates that the current status is not OK, then data about that 12V sensor is added to the Health branch of the tree. You can select the 12V entry in either the Health or Voltage branch of the tree to display information about the sensor.

All sensors in either a critical or noncritical condition will appear in the Health branch of the tree in addition to their normal location in other areas of the navigation tree. In this way, you can get a quick summary of problem areas on your server and begin corrective actions.

Colored icons in the Health branch of the server tree indicate individual sensor status and overall server status:

- **Green:** healthy server
- **Yellow:** noncritical conditions
- **Red:** critical failures
- **Blue Question Mark:** unsupported sensors

The color of the overall server health icon will display the state of the most severe sensor status. If any sensor is in a critical condition (regardless of other sensors being in a noncritical condition), the server health status will be shown as critical (red). If there are only noncritical sensors, the server health status will be shown as noncritical (yellow). If all sensors report normal conditions, the server health status will be shown as OK (green).

## Chassis

PIC monitors chassis door open/closed switches for managed servers that support this feature. The number of sensors monitored depends on the server chassis.

The chassis intrusion sensor screen displays the current security status. Not all servers support this component.

When a chassis door that includes an open/close switch is opened, the vulnerable state is indicated as a critical condition in the health branch of the PIC Console, and the requested event actions are carried out. When all chassis doors that include an open/close switch are closed, PIC indicates the chassis is secure and carries out the requested event actions.

For systems that do not support chassis open/closed switches, this portion of the PIC Console will either not display or the chassis status will be reported as “Unknown.”

# Fan

The fan sensor screen displays actual fan RPM for systems that support this feature. The threshold appears in terms of the RPM value. If the current fan RPM value falls below the specified threshold value, then the sensor status changes and an event generates. For the systems that do not support fan RPM threshold, the threshold setting is 0 and read-only. If the fan stops, then the sensor status changes and an event generates.

PIC monitors two types of fans:

- **Rotation-sensing fans**—PIC can detect whether a fan has stopped but is not able to indicate which fan has failed. These fans, together, are treated as a single fan unit. Therefore, event actions must be configured for all fans together, rather than separately.
- **RPM-sensing fans**—PIC can detect whether an individual fan has either slowed or stopped and will display the actual fan RPM value for systems that support this feature. Each RPM-sensing fan is independently configurable with its own threshold and event actions.

If a rotation-sensing fan fails or an RPM-sensing fan crosses a threshold, the PIC Console displays the event as a critical condition via the health branch of the software, and the requested event actions are carried out.

For systems that do not support a fan RPM threshold, the threshold setting displays a “0” and is read-only in the PIC Console display.

# ICMB

The ICMB dialog allows you to configure options for the Intelligent Chassis Management Bus (ICMB).

The ICMB feature allows multiple remote devices to be interconnected and management information shared among them. For example, your managed server could be configured to be an ICMB primary server and report management information on other ICMB devices connected to it. Using ICMB, PIC can manage the power state of remote ICMB devices and view FRU information about those devices. The amount of FRU information available depends on the type of ICMB device you are trying to manage.

Through the PIC Console, you can switch your view of the primary managed server to one of the ICMB-managed devices and view the available information on that device without losing the connection with the primary server. You can change your view back to the primary server or any other ICMB-managed device at any time. Through the PIC Console, you can configure the ICMB management features of the primary managed server and the remote ICMB-managed devices.

- **Local ICMB Server Configuration**—With this option it is possible to enable the local server as a management point, enable the full sensor view of remote devices, and change the discovery period for remote devices.
- **Remote ICMB Chassis Configuration**—With this option it is possible to configure each remote device discovered via ICMB. You can decide whether to manage the remote device, enable full sensor view for the remote device, and set the event polling rate for the remote device.



You can reclaim inactive ICMB system resources on the primary server. Doing so frees the memory taken up by the SDR and FRU information on the primary server for any remote device that is no longer visible on the network (via ICMB).

## Memory Array

The memory array sensor screen displays information and status about each memory array. Sensor-specific information is displayed in the Sensor Information tabbed page. Not all servers support this component.

## Memory Device

The memory device sensor screen displays information and status about each memory device. Sensor-specific information is displayed in the Sensor Information tabbed page. Not all servers support this component.

## PCI HotPlug Device

The PCI HotPlug Device sensor screen displays information about each PCI Hot Plug device installed in a PHP slot. If the server hardware does not support PCI HotPlug it will not appear in the navigation pane and the screen will not be available.

## Power Supply

The power supply sensor screen displays information and status about each power supply. Sensor-specific information is displayed in the Sensor Information tabbed page. Not all servers support this function.

## Power Unit

For systems that support it, PIC monitors the status of the power supplies in the managed server. Each power supply is independently configurable for event actions upon failure. The power unit sensor screen displays information and status about each power unit. Not all servers support this component.

If a power supply reports a predictive failure condition, then PIC reports the status as a non-critical condition in the health branch of the PIC Console software, and the requested event actions are carried out.

If a power supply fails, the failure is reported as a critical condition in the health branch of the PIC Console software, and the requested event actions are carried out. PIC also reports the system power as nonredundant and as a noncritical condition in the health branch of the PIC Console software, and the requested event actions are carried out.

For systems that do not support power supply sensors, this portion of the PIC Console software will not display.

For those systems that support it, PIC monitors the managed server's system power redundancy status.

If a power supply fails or if the surplus power on the system is less than the amount provided by one power supply, PIC reports that the system power is nonredundant. This condition is indicated with a noncritical status in the health branch of the PIC Console software and the requested event actions are carried out.

## Processor

The processor sensor screen displays information and status about each processor. From this screen, you can find out the type and speed of the processor. Sensor-specific information is displayed in the Sensor Information tabbed page. Not all servers support this function.

For motherboards that support it, PIC monitors processor failures during runtime and system boot on the managed server. If a supported motherboard includes multiple processors, each processor can be configured and monitored separately through PIC. If a processor failure is detected, the failure is reported as a critical condition in the health branch of the PIC Console software, and the requested event actions are carried out.

If processor sensors are not available on the motherboard, this portion of the PIC Console does not display.

## System Slots

ISC gathers sensor information and slot status on all slots in your managed server. The slots are categorized into two groups:

- PCI Hot Plug (PHP) slots (if the server hardware supports PCI HotPlug).
- All other non-PHP system slots.

Slot names containing "PCI 64bit" identify PHP slots. For PHP slots, there are three pages available in the presentation pane: Sensor Information page, Sensor Status page, and Alert Action page.

For non-PHP slots, only the Sensor Information pages displays.

## System Information

PIC gathers information on field replaceable unit (FRU) components installed in your managed server. This information includes a component description, manufacturer, model, part number, component number, serial number, and revision level. PIC also gathers information on other system resources including Operating System, BIOS, and the System Event Log.

The inventory screen displays a list of components within the system. The inventory list shows the description, manufacturer, model number, part number, serial number, and revision level of baseboard components. The inventory list will include information on the baseboard, processor board, chassis, power share board, hot-swap backplane, and memory devices.

If your server does not support one or more of these features, these portions of the PIC Console will not display.

## Temperature

The temperature dialog contains all temperature sensors. You can see individual sensor information in the presentation pane by selecting the corresponding sensor node from the navigation tree. You can monitor current temperature readings, current status, sensor error counts, and set sensor thresholds. Depending on the individual temperature sensor and the server platform, some thresholds are unsupported and they appear disabled, grayed out, in the control. The status indicator in the upper left-hand corner shows the current status: a red stop sign means “Critical,” a yellow caution sign means “Non-Critical,” and a green traffic light means “OK.”

The following table displays the information available for the temperature sensors.

| Item                     | Description  |
|--------------------------|--|
| Maximum Reading          | The highest reading supported on this sensor.  |
| Minimum Reading          | The lowest reading supported on this sensor.   |
| Sensor Accuracy          | The sensor's accuracy in +/- hundredths of a percent.  |
| Sensor Tolerance (plus)  | The amount of variation over the actual value that can be reported.                                  |
| Sensor Tolerance (minus) | The amount of variation under the actual value that can be reported.                                 |
| Sensor Resolution        | The smallest unit of measurement reported by the sensor.   |
| Nominal Reading          | The expected normal reading for this sensor.   |
| Lowest Normal Reading    | The lowest normal reading of this sensor. Readings below this value indicate an abnormal condition.  |
| Highest Normal Reading   | The highest normal reading of this sensor. Readings above this value indicate an abnormal condition. |

## Interaction with Third-Party Components

You can configure event actions for DMI indications generated by third-party Server Instrumentation installed with PIC. You can also monitor third-party instrumentation via the DMI Explorer Interface. PIC supports event configuration for Adaptec SCSI, LSI (Symbios) SCSI, QLogic SCSI, Promise IDE, and LAN Adapter Server Instrumentation.

## Voltage

In a managed server, PIC monitors many types of voltage sensors; the number and type depend on the server hardware configuration. Each monitored voltage sensor has independently configurable thresholds and event actions. Example voltage sensors are:

- 12V, 5V, 3.5V, 3.3V, -5V, -12V
- Processors 1.5V and 2.5V
- SCSI A Termination 1, 2, and 3

The voltage dialog contains all voltage sensors. You can see individual sensor information in the presentation pane by selecting the corresponding sensor node from the navigation tree. With this control, you can monitor current readings, current status, sensor error counts, and set sensor thresholds. Depending on the individual voltage sensor and the server platform, some thresholds are unsupported and they appear disabled (grayed out) in the control. The indicator in the left-hand

corner shows the current status: a red stop sign means “Critical,” a yellow caution sign means “Non-Critical,” and a green traffic light means “OK.”

The following table displays the information available for the voltage sensors.

| Item                     | Description  |
|--------------------------|--|
| Maximum Reading          | The highest reading supported on this sensor.  |
| Minimum Reading          | The lowest reading supported on this sensor.   |
| Sensor Accuracy          | The sensor's accuracy in +/- hundredths of a percent.  |
| Sensor Tolerance (plus)  | The amount of variation over the actual value that can be reported.                                  |
| Sensor Tolerance (minus) | The amount of variation under the actual value that can be reported.                                 |
| Sensor Resolution        | The smallest unit of measurement reported by the sensor.   |
| Nominal Reading          | The expected normal reading for this sensor.   |
| Lowest Normal Reading    | The lowest normal reading of this sensor. Readings below this value indicate an abnormal condition.  |
| Highest Normal Reading   | The highest normal reading of this sensor. Readings above this value indicate an abnormal condition. |

# Managing Servers with PIC

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## Viewing / Configuring Sensor Information

To view or configure a sensor (such as voltage, temperature), do the following steps:

1. On the PIC main window, click beside a sensor name in the navigation pane to see the list of available sensors.
2. Select an entry from the list.
3. Switch between the available tab pages (**Sensor Settings**, **Alert Actions**, **Sensor Information** or **Inventory Information**) to view or update the information.
4. Click <Apply> for any changes made to the sensor configuration.

At any time you can change views to another sensor by selecting another component in the navigation pane.

If you try to change your view and you have not saved any configuration changes using the Apply button in the presentation pane, PIC prompts you to save or discard the changes before switching to a new view.

## Viewing System Information

To view system information (such as FRU, Operating System, BIOS, and SEL) on the managed server or managed ICMB device, do the following steps:

1. On the PIC main window, click beside the System Information name in the PIC navigation pane to see the list of options.
2. Select an entry from the list.
3. View the information in the corresponding tab page in the presentation pane.

At any time you can change views to another sensor by selecting another component in the navigation pane.

On components that support FRU data, this inventory information is also displayed on the Inventory Information tab page associated with that component.

## System Event Log

The PIC Console software displays the System Event Log (SEL) maintained by the managed server's platform hardware. The SEL is a collection of log entries stored in nonvolatile flash memory.

The Platform Instrumentation automatically extracts event information from the SEL and triggers any user-configured actions associated with that event. The Platform Instrumentation clears the SEL when it is near an out-of-space condition. The PIC Console software also displays the SEL logging status (whether the SEL is Active or Inactive).

The SEL records displayed through PIC include additional timestamp information not available when reading the raw SEL file through DPC or Client SSU. The platform instrumentation code

sets the timestamp of SEL records written prior to a system boot record using the timestamp from the boot record.

## Configuring Thresholds

There are two basic types of threshold:

- **Range-based thresholds** for which a variety of values can be set. Example uses: for temperatures, voltages, and RPM-sensing fans.
- **State-based thresholds** that have fixed values like OK or Critical. Example uses: for rotation-sensing fan, chassis door, and memory array.

### To Configure a Range-Based Threshold

Most voltage sensors, temperature sensors, and RPM-sensing fans have one, two, or four configurable thresholds, depending on your server. Example thresholds are:

- Upper Critical
- Upper Noncritical
- Lower Noncritical
- Lower Critical

Some special sensors do not have configurable thresholds and are displayed for monitoring purposes only.

You can customize the threshold value to suit your working environment.

You can specify what action should occur when the sensor detects that one of the threshold values has been crossed (i.e., the sensor state changes).

- Status Changed to OK
- Status Changed to Upper Critical
- Status Changed from OK to Upper Noncritical
- Status Changed from Critical to Upper Noncritical

These thresholds and sensor state changes let you configure progressive responses in PIC to increasingly serious hardware conditions. For example, noncritical thresholds might be configured to emit a beep from the speaker and send a broadcast message, while critical thresholds might require more serious actions, like a server shutdown.

To configure a range-based threshold:

1. On the PIC main window, click beside the sensor name in the navigation pane to see the list of available sensors.
2. Select an entry from the list.
3. Change the threshold values as needed on the Sensor Settings tab page.
4. Click <Apply> for any changes made to the threshold value configurations.
5. If you want to change the event actions associated with threshold state change conditions, make the changes on the Alert Actions tab page.
6. Click <Apply> for any changes made to the alert action configuration.

**NOTE**

After applying new threshold values that may cause an event indication, the sensor status icon displayed on the Sensor Settings tab page may not change. The console refreshes the display before the new threshold value takes effect on the server, making it appear as though the sensor icon does not accurately reflect the current state of the sensor. Use the menu option, View->Refresh, or the F5 keyboard shortcut, to update the Sensor Settings tab page.

**To Configure a State-Based Threshold**

The state-based thresholds for processor, power supply, rotation-sensing fans, chassis door, and memory arrays have a fixed set of values, not a range. Example state change conditions:

- Single Bit Memory Error
- Processor Thermal Trip
- Power Supply Failed

**NOTE**

For systems that support rotation-sensing fans, the fan RPM threshold setting displays a “0” and is read-only in the PIC Console software.

PIC generates an event whenever the state of these items changes. You can specify which actions should occur in response to changes. To configure a state-based threshold:

1. On the PIC main window, click beside a sensor name in the navigation pane to see a list of available sensors.
2. Select an entry from the list.
3. Select the Alert Actions tab. Change the event actions associated with a state change condition.
4. Click <Apply> to save your changes.

**Cautions in Setting Thresholds****Threshold Values Rounded Off**

Hardware rounding causes set thresholds to not be the exact value set by software. Redisplay the Sensor Settings tab page to find the actual value set by the software.

**Avoiding a Power On/Off Loop**

Improperly setting event actions can cause the server to enter a state that prevents the server from booting correctly. This can occur in the following scenario:

1. An event occurs. Example: a high-temperature threshold is exceeded.
2. While the condition causing the event still exists, you set a Shutdown/Power Control Action, like Immediate Power Off, to respond to this event.
3. Because the threshold has already been exceeded, no event is triggered to cause the Immediate Power Off action to occur.

4. If you reboot the system and the event condition has not been corrected (such as the temperature is still over threshold), the system detects the temperature condition, triggers the event, and the corresponding action is taken. In this example action, Immediate Power Off, the system is automatically and immediately powered off.

When the system is powered up, an infinite loop of power-up and power-down begins. To break this cycle, either:

Clear the event condition (cool down the system in this example).

OR

Create a file named C:\LRA.NOT (or insert a diskette with file \LRA.NOT in A: drive) before the OS boots. The existence of this file disables the software component that responds to the event. The contents of the file are not important. You must then delete this file after the problem is fixed to allow the software to operate normally.

## Avoiding a Reboot-Fail Retry Loop

User-defined threshold values and other user-defined configuration attributes are written to disk (persistent storage) so they are available when the server reboots. These “remembered” values replace the PIC default values when PIC initializes.

When you change a threshold value or alert action in PIC, you can create an environment in which an event is immediately generated, such as setting the Upper Noncritical Threshold value below the current sensor reading. If the configured event actions on this threshold included a Shutdown or Power Control action as described earlier, the server would trigger the Shutdown or Power Control action and could enter a reboot-fail-reboot-fail cycle using the new threshold value.

To help avoid this situation, PIC updates the server in two steps:

1. Any change you make is valid immediately in the active instrumentation, but PIC waits five minutes before writing user changes to disk. Thus, if the change causes the server to reboot, the previous value is restored from disk when the server reboots.
2. PIC then uses and displays the previous value, thus avoiding the immediate reboot-fail-reboot-fail cycle.

Any change you make will be successfully written to disk as long as the motherboard instrumentation continues running for five minutes after the change is saved.

## Configuring Threshold Event Actions

On the Alert Actions tab page, you can select actions that will take place when a sensor exceeds a threshold or changes state.

### NOTE

If the OS is disabled by a non-critical event (such as a voltage surge), then critical actions will not be carried out because the OS has been shut down. It is best to use warnings (such as a speaker beep, a broadcast, etc.) for non-critical conditions.

The following table lists the available actions in PIC. You can specify multiple audio/visual notifications per event but only one shutdown/power control action.



| Action   | Description  |
|--|--|
| Emit a beep from the managed server's speaker  | Speaker emits a beep.  |
| Display an alert message on the managed server | Default action for noncritical and critical indications. The message box stays up until acknowledged.<br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1 the alert message is displayed as a text message on the server console.  |
| Log the event to disk                          | Default action for all indications. This option records the event in the standard system error log.<br>On Windows 2000 Advanced Server, PIC records the event in the System Event Log, which you can view with the Event Viewer.<br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1, events are logged in the system log file: /var/log/messages. |
| Log the event to disk                          | Default action for all indications. This option records the event in the standard system error log.<br><br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1, events are logged in the system log file: /var/log/messages.  |
| Broadcast a message                            | Default action for critical indications.<br>On Windows 2000 Advanced Server, the message goes to all the users currently logged into the managed server.<br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1 a text message is sent to all users currently logged onto the UNIX server.  |
| Broadcast a message                            | Default action for critical indications.<br>.<br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1 a text message is sent to all users currently logged onto the UNIX server.   |
| Write a message to the managed server's LCD    | Default action for all indications. If the LCD is not available on the managed server, this option is grayed out and disabled.   |
| Page an administrator                          | A page is sent to a specified pager, with the phone number of the server, an ID number, or other numerical information.  |
| No shutdown                                    | Default action for all indications. Select this option if you do not want to shut down or reset the server when an event occurs.   |
| Shutdown the OS                                | Select this option if you want to shut down the OS gracefully (controlled, closing files and applications).<br>On Windows 2000 Advanced Server, the server is set to a state ready for manual power-off or reset.<br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1, standard shutdown is completed and system prompts for reboot or power off.  |
| Shutdown the OS                                | Select this option if you want to shut down the OS gracefully (controlled, closing files and applications).<br>On Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1, standard shutdown is completed and system prompts for reboot or power off.  |
| Shutdown the OS and power off                  | Select this option if you want to shutdown the OS gracefully and turn off the system power.  |
| Shutdown the OS and hardware reset             | Select this option if you want to shutdown the OS gracefully and reset the server via hardware.  |

|                          |  |
|--------------------------|--|
| Immediate power off      | Select this option if you want to immediately power down the server. This action is an immediate power-off without a shutdown of the OS; it might corrupt files.                 |
| Immediate hardware reset | Select this option if you want to immediately reset the server via hardware. This action is an immediate hard reset without a shutdown of the OS; it might corrupt files.        |
| Immediate NMI            | Select this option if you want to cause a hardware Non-Maskable Interrupt (NMI). If this feature is not supported on the managed server, this option is grayed out and disabled. |

Procedure:

1. On the PIC main window, click beside a sensor name in the navigation pane to see the list of available sensors.
2. Select an entry from the list.
3. Select the Alert Actions tab.
4. Select the threshold type or state change condition.
5. Change the event actions associated with the selected threshold type or state change condition.
6. Click <Apply> to save your changes.

## Overriding Power Off or Shutdown Action

Power off or shutdown actions can be globally overridden while allowing other event actions (e.g., paging, broadcast message, etc.) to take place. This can be done in two ways.

To override power off or shutdown actions during installation of the ISC software, select "Event notification only" under the "Platform Instrumentation" feature in the feature selection dialog. By default, during installation, the power off or shutdown actions are enabled.

If ISC has already been installed, the following is the corresponding configuration instructions for each operating system of your server:

### Windows 2000 Advanced Server

Set the `NotificationOnly` parameter in the `%ISCPATH%\bin\lra.cfg` file to `TRUE` and reboot the server.

### Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1

Set the `NotificationOnly` parameter in the `/usr/local/isc/bin/lra.cfg` file to `TRUE` and reboot the server.

To re-activate the power off or shutdown action, set the `NotificationOnly` parameter in the corresponding file under each operating system described above to `FALSE` and reboot the server.

## Configuring Third-Party Event Actions

On the Alert Actions tab page, you can select actions that will take place when a third-party component exceeds a threshold or changes state.

You can configure event actions for the following third-party components:

- Adaptec SCSI
- LSI (Symbios) SCSI
- QLogic SCSI
- Promise IDE
- LAN Adapter

To configure event actions for third-party indications:

1. On the PIC main window, click beside the third-party component name in the navigation pane.
2. Update the Alert Actions tab. Change the event actions associated with a threshold type or state change condition.
3. Click <Apply> to save your changes.

The following table provides event information for third-party component instrumentation supported by PIC.

| Instrument (Notes)  | Choices  |
|---------------------|--|
| Adaptec SCSI*       | <b>Storage Device Events Group</b><br>Storage device state information<br>Storage device recovered error - Bad block repaired<br>Storage device member marked down<br><b>Storage Controller Events Group</b><br>Storage Controller state information<br>Storage Controller SMART event<br>Storage Controller status unacceptable<br><b>Volume Set Events Group</b><br>Volume set state information<br>Volume set recovered error<br>Volume set Array status – offline<br><b>Spare Events Group</b><br>ARO spare not functional<br><b>Enclosure Events Group</b><br>Enclosure state information |
| LSI (Symbios) SCSI* | <b>Storage Devices Events Group</b><br>Device Error (not responding)<br>Device Warning (predicted failure(S.M.A.R.T.))<br><b>Storage Controller Events Group</b><br>Controller Error (not responding)<br><b>Mass Storage Association Events</b><br>New Storage controller detected<br>New device detected<br>Existing controller changed<br>Existing device changed  |

Note Event actions do not distinguish between instances of the same group. This means that event actions are configured for a “class” of objects (i.e., host adapter) and not on individual instances of the group (i.e., host adapter 1, host adapter 2).

| Instrument (Notes) | Choices  |
|--------------------|--|
| Intel LAN Adapter  | <b>Indication Control Group</b><br>Total transmit errors threshold<br>Total receive errors threshold<br>Total host errors threshold<br>Total wire errors threshold   |
| LAN Adapter        | <b>Indication Control Group</b><br>Total transmit errors threshold<br>Total receive errors threshold<br>Total host errors threshold<br>Total wire errors threshold   |
| QLogic SCSI        | <b>Storage Devices Events</b><br>New or Recovered Storage Device<br>Error Storage Device Not Responding<br>Device Warning (predicted failure (S.M.A.R.T.))<br><b>Storage Controller Events</b><br>Informational SCSI Controller Event<br>Non-Critical SCSI Controller Error<br>Critical SCSI Adapter Event |

|             |   |
|-------------|---|
| Promise IDE | <b>Mass Store Logical Drive Events</b><br>IDE RAID Array OK<br>Non-Critical IDE RAID Array Event<br>IDE RAID Array Off-line<br><b>Disk Events</b><br>IDE Disk Status OK<br>IDE Disk Status Critical |
|-------------|---|

Note Event actions do not distinguish between instances of the same group. This means that event actions are configured for a "class" of objects (i.e., host adapter) and not on individual instances of the group (i.e., host adapter 1, host adapter 2).

## Switching Views Between the Primary (Managing) Server and an ICMB Device

To view a different server (ICMB device) in the navigation pane of the PIC main window, do the following steps:

1. On the PIC Main Menu Bar, click the ICMB->View Managed Server(s) menu selection.
2. A list of ICMB devices is displayed. Select an entry from the list to view.
3. Click <OK>.

The tree in the navigation pane is replaced with information about the new device. At any time you can change views to another ICMB device by repeating the steps above.

To return your view to the primary server in the navigation pane of the PIC main window, click the ICMB->View Managing Server menu selection on the PIC Main Menu Bar.

## Configuring ICMB on the Primary (Managing) Server

To configure ICMB on the primary (managing) server, do the following steps:

1. On the PIC Main Menu Bar, click the ICMB->View Managing Server menu selection to switch to the primary server if you are viewing an ICMB device.
2. In the PIC navigation pane, click beside the ICMB component name in the navigation pane.
3. Update the ICMB tab page.
4. Click <Apply> for any changes made to the ICMB configuration.

## Configuring the Watchdog Timer Value

Each motherboard supported by PIC has a watchdog timer implemented in the hardware; the timer is disabled by default. When enabled, the timer continually decrements to test the response of the server operating system. Under normal operating conditions, the PIC server instrumentation software periodically resets the time to prevent it from reaching a value of zero. If the OS hangs, the timer will count down to zero.

If the timer reaches a value of zero, indicating an OS hang, the watchdog timer will reset the system. The default timer value is two minutes with minimum and maximum allowable settings of two to sixty minutes.

To configure the watchdog timer value, do the following steps:

1. On the PIC Main Menu Bar, click the Configure->Watchdog Timer Value menu selection.
2. Update the timer value.
3. Click <OK>.

## ECC Memory

PIC reports memory status information, both memory arrays and memory devices, for systems that support ECC memory. The ECC memory subsystems can detect and report both single-bit errors (SBE) and multiple-bit errors (MBE).

Depending on the managed server hardware, memory devices are either SIMMs or DIMMs. Memory device references use the appropriate device name in the PIC Console software.

## Single-Bit Error Handling

If a SBE occurs, the system generates an SMI that allows the BIOS to log information about the error in the System Event Log (SEL). This information identifies the exact SIMM or DIMM in which the error occurred. Because this condition is recoverable, BIOS returns the system to normal operation after logging the error.

This error is indicated in the health branch of the PIC Console software as a noncritical condition, the requested event actions are carried out, and a noncritical error count is incremented on the Sensor Settings tab page of the software.

Also, the following actions occur in the PIC Console software:

- The Device Error Type is set to SBE on the Sensor Information tab page for the Memory Device.
- The Last Error Update value is set to “During PIC Runtime,” indicating the update occurred while the system was operational.

The BIOS stops logging noncritical SBEs when the SBE error count reaches nine. This prevents the errors from filling the SEL. Upon system reboot, the OS uses the SEL records, along with the results from its own memory test, to map out bad memory by reducing the usable size of a memory bank to avoid using the bad memory element(s). This elimination of hard errors is a precaution that prevents SBEs from becoming MBEs after the system has booted, and also to prevent SBEs from being detected and logged each time the failed location(s) are accessed. Upon reboot, the SBE error count is set to zero in the SEL.

## Multiple-Bit Error Handling

If an MBE occurs, the system generates an SMI that allows the BIOS to log information about the error in the SEL, identifying the memory bank in which the error occurred. However, on some systems, it is not possible to determine the exact SIMM/DIMM that caused an MBE.

Because an MBE is a critical condition, upon logging the error the BIOS generates an NMI that halts the system. Upon rebooting the server, this error is indicated as a critical condition on the Memory Array and Memory Device in the health branch of the PIC Console software. The

requested event actions are carried out, and the critical error count is incremented on the Sensor Settings tab page of the software.

Also, the following actions occur in the PIC Console software:

- The Device Error Type is set to MBE on the Sensor Information tab page for the Memory Device.
- The Last Error Update value is set to Previous Boot, indicating the last update occurred during the last system boot.

## Memory Tables

The following tables compare the steps taken with Single-bit and Multi-bit errors and provide the type of memory information available from the PIC Console software.

### SBE and MBE Comparison

| Memory Error Handling                   | SBE                | MBE                                 |
|---|--------------------|-------------------------------------|
| Generate SMI                            | Yes                | Yes                                 |
| Log information includes                | Exact SIMM or DIMM | Memory bank only                    |
| Action after SEL logging                | Continue operation | Stop the system                     |
| Indicated by PIC screen changes         | Immediately        | After the system reboots            |
| Bad memory is mapped out at next reboot | Yes                | Yes (immediately after the failure) |

Information available on the Sensor Information tab page of the PIC Console software:

### Memory Array Dialog

| Item                              | Description  |
|-----------------------------------|--|
| Maximum Memory Capacity           | The maximum memory capacity in bytes on this system                                      |
| No. of Memory Device Sockets      | The number of memory device (SIMM/DIMM) slots or sockets available in this memory array  |
| No. of Memory Device Sockets Used | The number of slots or sockets populated by the memory devices in this memory array      |
| Memory Error Correction           | The hardware error correction or detection method supported by this memory array         |
| Memory Array Location             | The physical location of the memory array, whether on the motherboard or an add-on board |

Information on the Sensor Information tab page of the PIC Console software:

### Memory Device Information

| Item              | Description  |
|-------------------|--|
| Size              | Size of the memory device in bytes.  |
| Memory Type       | Type of memory used in the memory device.  |
| Device Locator    | A string identifying the socket location or board position of the memory device.<br>Example: "SIMM 3" or "IC12."               |
| Device Error Type | Most recent type of error that occurred on the memory device.  |
| Last Error Update | System state during the last error update.   |
| Total Width       | Total width of the memory device (SIMM/DIMM including check bits), in bits.  |
| Data Width        | Data width of the memory device in bits.   |
| Type Detail       | More information about the memory device type.   |
| Error Count       | Summary of the error status for the memory device. This read-only attribute contains a count of all SBEs on the memory device. |



## Local Response Agent (LRA) Paging

Platform Instrumentation Control lets you configure the paging features available with Baseboard Management Controllers (BMC) and Platform Instrumentation (PI). Actual paging activities are performed by the BMC. If the server hardware does not support LRA, the Paging Configuration menu item is grayed out.

### Initiating a Page

To specify that a page be sent in response to an alert, check the “Send a Page” box in the Alert Actions dialog for the event.

### Paging Configuration

Select Configure->Paging Configuration from the main menu in PIC. This configuration is global to the server and not sensor-specific—the same page will be sent in response to all events that have “Send a Page” specified.

The Paging Configuration screen lets you configure the following information:

**Global Paging Enabled:** This checkbox specifies whether the paging feature is globally enabled or disabled. If disabled, enabling paging action in the Alert Actions dialog has no effect.

**Default Pager #:** This is the number paged when a paging action is triggered. If it is blank, no paging occurs. The Test Page button calls this number.

Enter the full pager number the way it should be dialed, including the initial number if any needs to be dialed to get a dial tone, commas (‘,’) for pause characters, area code, etc. For example, “9,6903115” specifies a 9 to dial out, pause, then a local number without area code. After the pager number, you can include another pause followed by any numeric data to be sent. All numeric data must be entered in the Pager Number field. For example, you might enter a modem phone number to dial back, a numeric ID, etc. Alphabetic data is not allowed.

**Additional Pager #1 and #2:** These are additional pager numbers which are called after the default pager number when a paging event occurs. Enter all data including the numeric message as described above. These numbers are not called when the Test Page button is pressed.

To test one of these numbers, you must copy it to the Default Pager # field, then press the Test Page button.

**Repeat Paging:** The Repeat Paging feature pages the administrator multiple times in a critical situation. You may configure both the Repeat Paging Count and the Repeat Paging Interval. The Number of Pages specifies how many times each pager number will be paged (from 1 to 100). If you have specified three pager numbers, three times as many pages will be sent.

The Repeat Paging Interval specifies the interval in minutes between each cycle of pages (one cycle includes sending a page to all configured pager numbers). The Number of Pages defaults to 1, and if it is set to 1, the Repeat Paging Interval value is not needed. If you set the value of Number of Pages greater than 1, the Repeat Paging Interval field is enabled. The minimum and default value of Repeat Paging Interval is one minute. The maximum value is 1440 minutes (24 hours).

Before saving the information, you can press the Test Page button to verify if the default pager number is correct.

Click the OK button to save the information and exit from the screen.

Click the Cancel button to restore the previous information and exit from the screen.

## Customizing PIC Administrator Options

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The Platform Instrumentation Control console has several adjustable options. You can set the PIC console refresh rate, determining how PIC is updated with current information. You can specify whether temperatures display in Celsius or Fahrenheit, and whether you want to restore PIC settings to the factory defaults. These settings are global and affect any open PIC session.

PIC installs with the following defaults:

- PIC console refresh interval: 10 seconds
- Temperature display format: Celsius
- Watchdog feature: off
- Watchdog timer: two minutes
- Sensor threshold values as defined in the SDR file

To configure the refresh interval or temperature display format:

1. On the PIC Main Menu Bar, click the View->Options menu selection.
2. Change the refresh interval or temperature display format on the Options dialog.
3. Click <OK>.

### NOTE

For servers that support server health update events, configuring the console refresh interval is not necessary or applicable. For other servers, when configuring the console refresh interval, selecting a frequent refresh interval impacts system performance on both the console and the managed server because the ISC polls for the health status of each monitored sensor. Selecting a less frequent console refresh interval provides a reasonable information update, while minimizing the overhead on system performance. The console refresh interval does not impact how quickly the server system responds to event notifications (e.g., threshold crossings) only how quickly the ISC main screen display updates with server information. A value of 15 seconds or greater for console refresh value provides a reasonable compromise.

To restore default PIC settings for threshold values and the watchdog feature:

1. On the PIC Main Menu Bar, click the Configure->Restore Factory Defaults menu selection.
2. Click <OK> on the confirmation dialog.

## NOTES

Event actions you have configured, the temperature display format, and refresh rate are not affected by the Restore Factory Default option.

Default threshold values are stored in Sensor Data Records (SDR) in nonvolatile storage on the motherboard. These values are determined and configured during motherboard manufacturing and are therefore not documented in this manual.

Indications may be generated if the restore of the default threshold value crosses the current sensor value. For example:

User defined threshold limit 13.5 V

Current sensor value 13.0 V

Default threshold value 12.5 V

When you select the Restore Default Settings action, threshold restore may cause a threshold crossing. In the above example, PIC would detect a threshold crossing and generate an indication. The actions associated with that indication would occur.

To avoid the possibility of unwanted indications when restoring defaults settings, adjust the user-defined threshold value so the current sensor value is not between the user-defined threshold value and the default threshold value.

# PIC Event Messages

---

PIC allows you to configure event actions to be taken on the managed server when an event occurs. These actions include audio/visual notifications, such as:

- Display an alert message
- Write a message to the LCD
- Broadcast a message

The message text is based on the event information. This text contains the DMI MIF group and attribute information that caused the error.

## Alert Messages on the Server Console

The following table lists the alert messages that display on the server console. The general format of these messages is:

Event reported for <attribute\_name> attribute in the <group\_name> group.

### Server Console Alert Messages

| Alert Message   | Description  |
|---|--|
| Event reported for Upper Critical Threshold attribute in the Temperature Sensor group.    | A temperature sensor on the system reported that the current value is above the upper critical range.  |
| Event reported for Upper Noncritical Threshold attribute in the Temperature Sensor group. | A temperature sensor on the system reported that the current value is above the upper noncritical range but below the upper critical range. This message is also generated when the temperature returns to the acceptable range. |
| Event reported for Lower Noncritical Threshold attribute in the Temperature Sensor group. | A temperature sensor on the system reported that the current value is below the lower noncritical range but above the lower critical range. This message is also generated when the temperature returns to the acceptable range. |
| Event reported for Lower Critical Threshold attribute in the Temperature Sensor group.    | A temperature sensor on the system reported that the current value is below the lower critical range.  |
| Event reported for Upper Critical Threshold attribute in the Voltage Sensor group.        | A voltage sensor on the system reported that the current value is above the upper critical range.  |
| Event reported for Upper Noncritical Threshold attribute in the Voltage Sensor group.     | A voltage sensor on the system reported that the current value is above the upper noncritical range but below the upper critical range. This message is also generated when the voltage returns to the acceptable range.         |
| Event reported for Lower Noncritical Threshold attribute in the Voltage Sensor group.     | A voltage sensor on the system reported that the current value is below the lower noncritical range but above the lower critical range. This message is also generated when the voltage returns to the acceptable range.         |

continued

**Server Console Alert Messages** (continued)

| <b>Alert Message</b>   | <b>Description</b>  |
|--|---|
| Event reported for Lower Critical Threshold attribute in the Voltage Sensor group.                   | A voltage sensor on the system reported that the current value is below the lower critical range. |
| Event reported for Current Status attribute in the Security Sensor group.                            | System chassis front panel or side panel has been opened (or it was open and has been closed).    |
| Event reported for Current Status attribute in the Cooling Fan group.                                | System fan has stopped (or restarted).  |
| Event reported for Array Error Type attribute in the Memory Array group.                             | A memory error has been reported on the system.   |
| Event reported for Event Status attribute in the Logical Unit group.                                 | A SCSI device reported a state change.  |
| Event reported for Event Status attribute in the Host Adapter group.                                 | A SCSI board reported a state change.   |
| Event reported for Operational State attribute in the Controller Information group.                  | A RAID controller reported a state change.  |
| Event reported for Operational State attribute in the Physical Drive Information group.              | A RAID drive reported a state change.   |
| Event reported for Processor Status attribute in the Processor group.                                | A processor sensor on the system reported a processor error.                                      |
| Event reported for Power Unit Redundancy Status attribute in the Power Unit Global Table group.      | The power supply redundancy sensor on the system reported a power supply redundancy state change. |
| Event reported for Total Transmit Errors Threshold attribute in the Indication Control group.        | The LAN Adapter reported that the number of transmit errors is above the threshold value.         |
| Event reported for Total Receive Errors Threshold attribute in the Indication Control group.         | The LAN Adapter reported that the number of receive errors is above the threshold value.          |
| Event reported for Total Host Errors Threshold attribute in the Indication Control group.            | The LAN Adapter reported that the number of host errors is above the threshold value.             |
| Event reported for Total Wire Errors Threshold attribute in the Indication Control group.            | The LAN Adapter reported that the number of wire errors is above the threshold value.             |
| Event "Status Changed to OK" reported in the Voltage Probe group.                                    | A Voltage probe changed its status to an OK state.  |
| Event "Status Changed to Lower Critical" reported in the Voltage Probe group.                        | A Voltage probe changed its status to Lower Critical state.                                       |
| Event "Status Changed to Upper Critical" reported in the Voltage Probe group.                        | A Voltage probe changed its status to Upper Critical state.                                       |
| Event "Status Changed from OK to Lower Noncritical" reported in the Voltage Probe group.             | A Voltage probe changed its status from normal to Lower Noncritical state.                        |
| Event "Status Changed from OK to Upper Noncritical" reported in the Voltage Probe group.             | A Voltage probe changed its status from normal to Upper Noncritical state.                        |
| Event "Status Changed from Lower Critical to Lower Noncritical" reported in the Voltage Probe group. | A Voltage probe changed its status from Lower Critical to Lower Noncritical state.                |

continued

**Server Console Alert Messages (continued)**

| <b>Alert Message</b>   | <b>Description</b>   |
|--|--|
| Event "Status Changed from Upper Critical to Upper Noncritical" reported in the Voltage Probe group.     | A Voltage probe changed its status from Upper Critical to Upper Noncritical state.     |
| Event "Status Changed to OK" reported in the Temperature Probe group.                                    | A Temperature probe changed its status to an OK state.                                 |
| Event "Status Changed to Lower Critical" reported in the Temperature Probe group.                        | A Temperature probe changed its status to Lower Critical state.                        |
| Event "Status Changed to Upper Critical" reported in the Temperature Probe group.                        | A Temperature probe changed its status to Upper Critical state.                        |
| Event "Status Changed from OK to Lower Noncritical" reported in the Temperature Probe group.             | A Temperature probe changed its status from normal to Lower Noncritical state.         |
| Event "Status Changed from OK to Upper Noncritical" reported in the Temperature Probe group.             | A Temperature probe changed its status from normal to Upper Noncritical state.         |
| Event "Status Changed from Lower Critical to Lower Noncritical" reported in the Temperature Probe group. | A Temperature probe changed its status from Lower Critical to Lower Noncritical state. |
| Event "Status Changed from Upper Critical to Upper Noncritical" reported in the Temperature Probe group. | A Temperature probe changed its status from Upper Critical to Upper Noncritical state. |
| Event "Internal Error" reported in the Processor group.  | A system processor reported an internal error.   |
| Event "Thermal Trip Error" reported in the Processor group.  | A system processor reported a Thermal Trip error.                                      |
| Event "FRB Error" reported in the Processor group.   | A system processor reported an error during the FRB (Fault Resilient Boot) sequence.   |
| Event "Redundancy Lost" reported in the Power Unit Global Table group.                                   | A power unit on the system lost the redundancy state.                                  |
| Event "Redundancy Regained" reported in the Power Unit Global Table group.                               | A power unit on the system regained the redundancy state.                              |
| Event reported on the Storage Device Event Type attribute in the Storage Device Events group.            | A predictive failure noncritical on a SCSI device.                                     |
| Event reported on the Storage Controller Event Type attribute in the Storage Controller Events group.    | A SCSI controller reported a state change.   |
| Event "Status Change to Ok" reported in the System Slot group.   | A PHP slot changed its status to OK.   |
| Event "Status Changed to Non-Critical" reported in the System Slot group.                                | A PHP slot changed its status to Non-Critical.   |
| Event "Status Changed to Critical" reported in the System Slot group.                                    | A PHP slot changed its status to Critical.   |
| Event "Slot Power On" reported in the System Slot group.   | A PHP slot changed its power state from Off to On.                                     |
| Event "Slot Power Off" reported in the System Slot group.  | A PHP slot changed its power state from On to Off.                                     |

## Broadcast and LCD Messages

The following table lists broadcast and LCD messages.

Broadcast messages are sent across the network to client computers. The general format of broadcast messages is:

Check <group\_name> at server <server\_name>

LCD messages are displayed on the managed server's LCD. These are limited to 32 characters; longer messages are truncated. The general format of LCD messages is:

Check: <group\_name>

### Broadcast and LCD Messages

| Message  | Description  |
|--|--|
| Check: Temperature Sensor.<br>Check: Temperature Probe.            | A temperature sensor reported a change in state (OK/Noncritical/Critical).                     |
| Check: Voltage Sensor.<br>Check: Voltage Probe.                    | A voltage sensor reported a change in state (OK/Noncritical/Critical).                         |
| Check: Security Sensor.<br>Check: Physical Container Global Table. | System chassis front panel or side panel has been opened (or it was open and has been closed). |
| Check: Cooling Fan.  | System fan has stopped (or restarted).   |
| Check: Memory Array.   | A memory error has been reported on the system.  |
| Check: Host Adapter.   | A SCSI board reported a state change.  |
| Check: Logical Unit.   | A SCSI device reported a state change.   |
| Check: Controller Information.                                     | A RAID controller reported a state change.   |
| Check: Physical Drive Information.                                 | A RAID drive reported a state change.  |
| Check: Processor.  | A processor error has been reported on the system.   |
| Check: Power Unit Global Table.                                    | A power unit redundancy state change has been reported on the system.                          |
| Check: Power Supply.   | A power supply failed on the system.   |
| Check: Indication Control Group.                                   | The LAN Adapter reported a threshold crossing.   |
| Check: Storage Device Events.                                      | A SCSI device reported a state change.   |
| Check: Storage Controller Events.                                  | A SCSI controller reported a state change.   |
| Check: System Slot.  | A PHP slot reported a state change.  |

# Appendix A. DMI to SNMP Translator

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You can use the DMI-SNMP Translator to integrate DMI management with SNMP. The translator attaches directly to the Network OS's SNMP agent and to the DMI Service Layer by registering as a management application. The translator translates management requests from SNMP to DMI and responses from DMI to SNMP. DMI events (indications generated by the component instrumentation when a threshold is crossed or a sensor changes state) are translated into enterprise-specific SNMP traps.

The translator translates these MIF files:

- Baseboard
- ICMB
- Local Response Agent
- Adaptec SCSI
- LSI (Symbios) SCSI
- Promise IDE
- LAN Adapter

The translator raises a trap when a DMI indication is received. The DMI-SNMP Translator does not support configured actions. This alerting mechanism works independently of the Local Response Agent.

For the DMI-SNMP Translator to work correctly, the SNMP Agent on the managed server OS must be configured correctly. For example, the Windows 2000 Advanced Server, or Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1 Agents need some configuration to enable the server to send SNMP traps to specific SNMP management consoles. To configure the SNMP Agent on the server, see the documentation supplied by the OS vendor.

To manage the DMI information on Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1 servers supplied by PIC software through the SNMP management workstation, the following MIBs must be compiled on the SNMP console:

- MAPBASE4.MIB
- MAPLRA.MIB
- MAPSHA.MIB

These MIB files are installed during the PIC Console and PIC Server installation. The files are copied to the %PIC\_PATH%\SNMPMIBS directory during installation. PIC\_PATH is the installation directory chosen during install.

The procedures for compiling these MIBs depend on the SNMP console being used. For more information, see the documentation supplied with your SNMP console software.



## Appendix B. Disallowing SNMP Set Requests

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The set action of some SNMP attributes causes the server to shutdown/power off. To globally disallow all set requests follow the appropriate instructions for your operating system.

### **Windows 2000 Advanced Server**

Change the `ReadOnly` entry in the `%ISCPATH%\bin\sdlink.cfg` file to `True` and reboot the server.

### **Linux Red Hat 7.1 and Red Hat Enterprise Linux AS 2.1**

Edit the `/etc/rc.d/init.d/dmi2snmpd` file as follows:

Under the case for start, change the line `./dmi2snmpd` which starts the DMI to SNMP translator daemon to `./dmi2snmpd -w` and reboot the server.